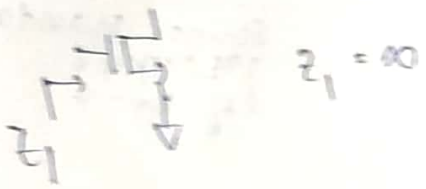
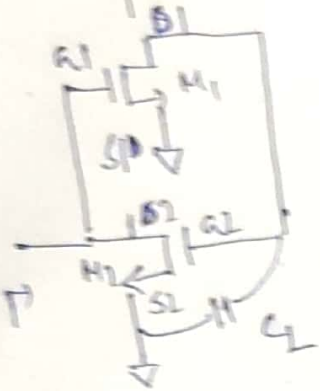
Sounak Mandal
19EC10088
Page No - 5

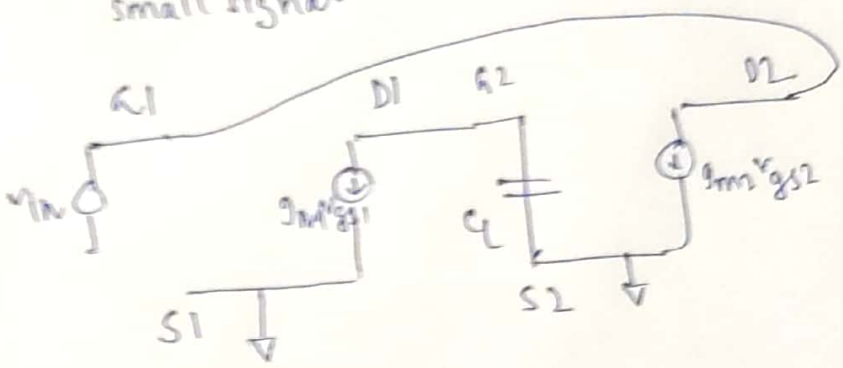
2.i)



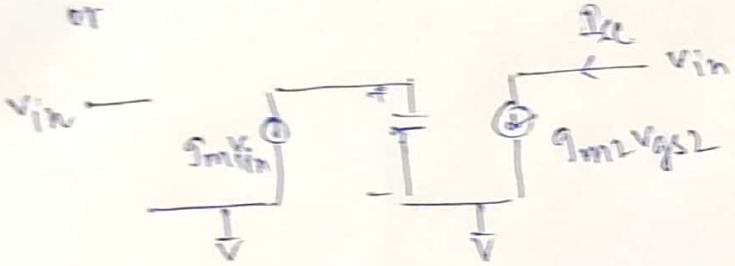
Ac eq circuit



small signal



or



$$v_{gs2} = \frac{g_{m1}v_{in}}{sC_L}$$

$$\therefore I_{sc} = g_{m2}v_{gs2}$$

$$I_{sc} = g_{m2} \times \frac{g_{m1}v_{in}}{sC_L}$$

$$\text{or } \frac{I_{sc}}{v_{in}} = \frac{g_{m1}g_{m2}}{sC_L}$$

$$Z_{in} = \frac{v_{in}}{I_{sc}} = \frac{sC_L}{g_{m1}g_{m2}} \quad \text{(Ans)}$$

The two transistors come in series as seen from the small signal equivalent along with C_L connected between gate and source of M_2. Hence such an expression is obtained